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ABSTRACT

This report, the 24th in an annual series on research expenditures of Texas public institutions of higher education, is based on data provided by each institution for fiscal year 1990. Institutions were asked to ensure that the data reported were consistent with their annual financial reports, and that they used a set of established definitions and data elements consistent with similar data collection efforts of the National Science Foundation. Some of the conclusions of the report include the following: total research expenditures increased 8.1 percent over fiscal year 1989; among public academic institutions, Texas A&M University (including Texas A&M Services) reported the highest research expenditures; the federal government provided 50.1 percent of research expenditures and continues to be the largest source of research funds; and institutions of higher education reported that 75.5 percent of their research is basic (as opposed to applied) research. Research expenditures in some areas of special interest included the following: cancer, $113,970,604; energy, $62,063,064; biotechnology, $58,840,009; food, fiber, agricultural products, $38,703,175; environmental science and engineering, $31,761,086. Finally, the top 10 research institutions together accounted for more that 90.7 percent of all research expenditures in the state. Many tables and figures illustrate the data. Appendix A is a copy of the survey form. Appendix B lists the institutional contact persons who submitted the data for the report. (JB)

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ED332637

RESEARCH EXPENDITURES

TEXAS PUBLIC INSTITUTIONS OF HIGHER EDUCATION

September 1, 1989 - August 31, 1990

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Texas Higher Education Coordinating Board
Educational Data Center
P. O. Box 12788
Austin, Texas 78711-2788

February 1991

HE 024 616

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The Texas Higher Education Coordinating Board was created by the Texas Legislature in 1965. It is charged with the responsibility to achieve "excellence for college education" for the people of Texas through the unified development of the Texas system of higher education; efficient and effective use of all resources; elimination of costly duplication in program offerings, facilities, and physical plants; and advocacy for adequate resources for the institutions to realize their full potential to educate.

The Board consists of 18 members from across the state, appointed by the governor with the advice and consent of the Senate for six-year terms.

Executive Summary

Fiscal year 1990 includes the period Sept. 1, 1989 through Aug. 31, 1990. The report is based on data provided by each institution. Some of the conclusions of this report include the following:

- Total research expenditures increased 8.1 percent over fiscal year 1989. Total research expenditures in fiscal year 1989 were $796,645,374, and research expenditures in fiscal year 1990 were $861,364,534.

- Among public academic institutions, Texas A&M University (including Texas A&M Services) reported the most research expenditures - $233,939,770. Among public health institutions, M.D. Anderson Cancer Center reported the most research expenditures - $91,283,483.

- The federal government provided 50.1 percent of research expenditures and continues to be the largest source of research funds.

- Institutions of higher education reported that 75.5 percent of their research is basic as opposed to applied research.

- Research expenditures in some areas of special interest include the following: Cancer - $113,970,604; Energy - $62,063,064; Biotechnology - $58,840,009; Food, Fiber, Agricultural Products - $38,703,175; Environmental Science and Engineering - $31,761,086.

- The top 10 research institutions together account for more than 90.7 percent of all research expenditures in the state.

This is the 24th in a series of annual reports produced by the Texas Higher Education Coordinating Board detailing research expenditures of public institutions of higher education.

This report differs from previous editions of this report in several ways:

An effort was made to make the data elements conform much more closely to those of a National Science Foundation survey of research expenditures that all research institutions complete.

Formal definitions of what constitutes research and various categories of research were provided. Again, NSF definitions were used when available.

Although some new types of information were added, overall the data provided by institutions has been significantly reduced.

The report incorporates a new graphic format.

Overview

This report is mandated by Section 61.051(h) of the Texas Higher Education Code. This statute includes the following,

> "Once a year, on dates prescribed by the board, each institution of higher education shall report to the board all research conducted at that institution during the last preceding year."

The Texas Higher Education Coordinating Board has implemented this mandate by producing a series of reports on research expenditures. This is the 24th such report. Readers who desire earlier editions of this report may obtain them from the Educational Data Center at the address on the cover of this report.

The report is based on **self-reported data**. Institutions are asked to ensure that the data reported for this purpose are consistent with their Annual Financial Reports. In addition, a set of definitions is provided (see appendix A). In spite of this, there is still some latitude in how data are reported from different institutions. While the Coordinating Board makes every effort to ensure that data are consistent and are accurately transcribed into this report, the Coordinating Board is not in a position to verify the accuracy of the data provided by the institutions.

The report is based on research **expenditures**. Expenditures, as opposed to awards, are commonly used by research administrators to reflect the general level of research activity. While awards are a leading indicator, expenditures more accurately reflect the true level of research activity currently underway. Expenditures are usually a more stable indicator because they fluctuate less than awards from year to year.

This report includes several **changes from previous years.** Data elements and definitions are now consistent with a similar research expenditures data collection effort of the National Science Foundation. This should reduce effort on the campuses, encourage better participation in the National Science Foundation survey, and result in better quality data. It was impossible to completely adopt the National Science Foundation data model because the foundation's interests are limited to science and technology, while the Coordinating Board is required to report on all research.

A regular reader of these reports will notice two other changes. First, the report has been significantly **simplified**. We believe that this simpler report has more-accurate information and presents the institutions with a less-demanding data collection task. Second, the report is much more graphically oriented than those produced in previous years. This is an effort to improve the readability of the report.

Several pieces of **new information** not compiled in previous years are included in the report. For the first time, an effort was made to determine the fraction of research support obtained through a peer-review process. Another first includes a separation between basic and applied research. Finally, data is being reported in several areas of special interest that have not been previously reported. Some of these include expenditures for research on AIDS, microelectronics, energy, etc.

Collecting these data provided the institutions with an especially challenging task. As examples, much research funding is the result of a combination of peer review and negotiation with sponsors rather than one or the other; many research projects include some basic and some applied research; many research projects are multidisciplinary and have implications for many different areas. Consequently, the data provided to the Coordinating Board and our summaries should be considered indicative rather than definitive. We expect that institutions will develop improved techniques for classifying projects in subsequent years.

Major Findings

Texas public institutions of higher education continued a long-term trend of **increasing research expenditures** during fiscal year 1990. Total research expenditures are up approximately 8.1 percent over fiscal year 1989. Expenditures in public universities increased 8.7 percent, while expenditures in health institutions increased 7.2 percent.

As in most states, most of the research capability exists in a relatively small number of institutions. Collectively, the 10 institutions reporting the most expenditures constituted 90.7 percent of total expenditures. The five institutions reporting the most expenditures constituted 74 percent of total expenditures.

Texas health institutions have very strong research programs. Five of the 10 research institutions that reported the most expenditures are health institutions.

The following table shows the relative rankings in fiscal years 1990 and 1989 for the top 10 research institutions:

Institution	FY 1990 Rank	FY 1989 Rank
Texas A&M University	1	1
UT at Austin	2	2
UT M.D. Anderson Cancer Center	3	3
UT Southwestern Medical Center	4	4
UTHSC at Houston	5	6
UTHSC at San Antonio	6	5
UTMB at Galveston	7	8
University of Houston	8	7
Texas Tech University	9	9
University of North Texas	10	11

As in all states, the federal government continues to be the largest source of research funding. Overall, the federal government provided 50.1 percent of all research expenditures by Texas public institutions of higher education. While no directly comparable data exists on the national level, the National Science Foundation reported that 60.8 percent of research spending by doctorate-granting universities in fiscal year 1989 was funded by the federal government.

Texas institutions report that state appropriations provide 22.9 percent of all research expenditures. Again, while no directly comparable national data exists, the National Science Foundation reports that in fiscal year 1989, 8.3 percent of research spending by doctorate-granting universities was funded by state and local governments. The ratio of expenditures from federal funds to state appropriated funds for the 10 institutions reporting the most expenditures is provided below:

Institution	Rank Total Expenditures	Ratio Federal/State Expenditures	Rank Ratio
Texas A&M University	1	1.29	7
UT at Austin	2	3.68	5
UT M.D. Anderson Cancer Center	3	0.70	9
UT Southwestern Medical Center	4	11.37	2
UTHSC at Houston	5	6.40	3
UTHSC at San Antonio	6	13.13	1
UTMB at Galveston	7	4.36	4
University of Houston	8	1.86	6
Texas Tech University	9	0.83	8
University of North Texas	10	0.56	10

Medical sciences, which accounted for 30.6 percent of the total, led all other disciplines for research expenditures. The top five disciplines (medical, engineering, biological and other life sciences, physical, environmental) collectively constitute 84.9 percent of all reported research expenditures.

In spite of a number of pressures to move into more applied research, institutions continue to provide most of their emphasis on basic research. Support of basic research totaled 75.5 percent of research expenditures.

Finally, institutions reported that 63.9 percent of research expenditures were the result of a peer-reviewed selection process.

Statewide Summary Data

Institutions of higher education receive external support for many activities that are somewhat related to research but are not, strictly speaking, research activities. These include activities such as equipment or facility grants, contracts to do various studies, training programs, etc.

Expenditures for the **conduct of research**, on the other hand, support specific research activities. For definitions of these terms, consult the data collection form reproduced in Appendix A. Expenditures for the conduct of research are the focus of this report, but information on other sponsored activities is provided in Figures 1, 2, and 4.

Figures 1 - 4 describe expenditures and sources of funds for the conduct of research and for other sponsored programs.

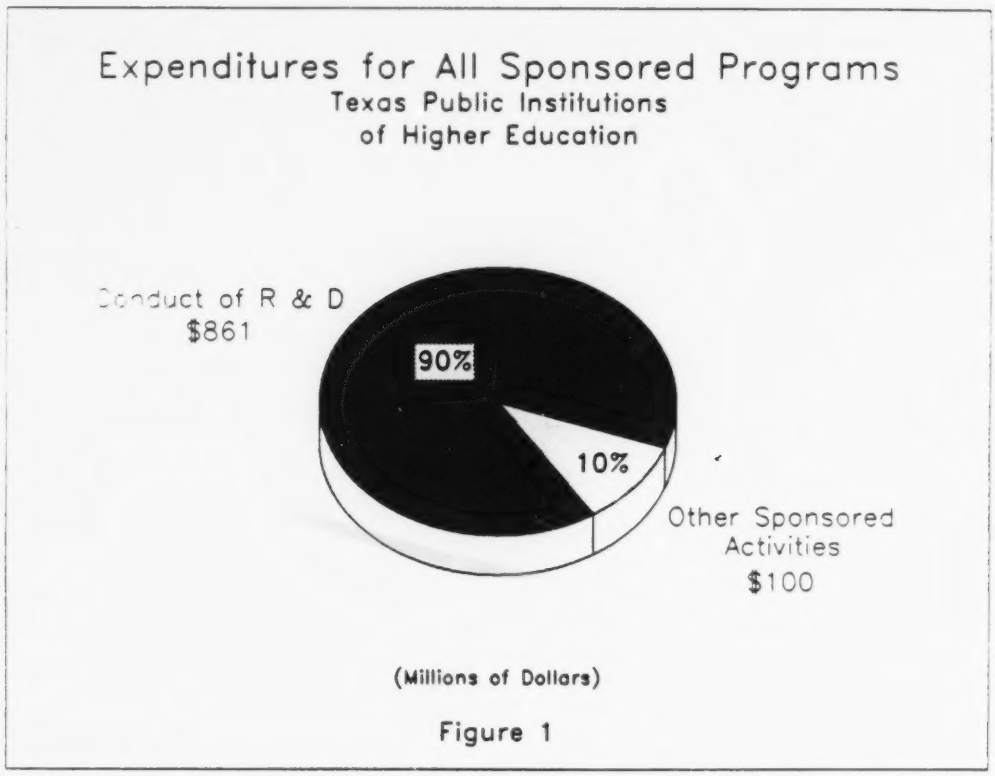
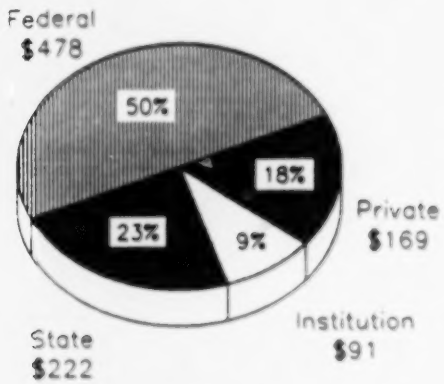


Figure 1

Sources of Funds for All Sponsored Programs

Texas Public Institutions of Higher Education

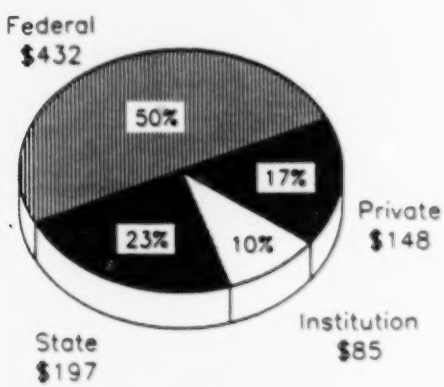


(Millions of Dollars)

Figure 2

Sources of Funds for Conduct of R&D

Texas Public Institutions of Higher Education



(Millions of Dollars)

Figure 3

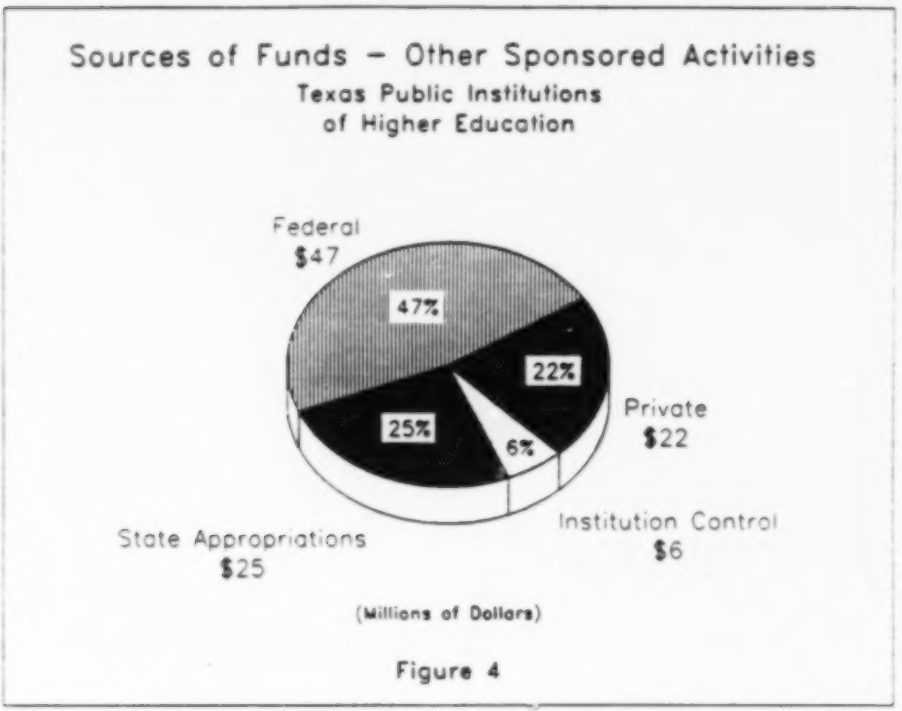


Figure 4

Table 1

Expenditures for Conduct of R&D by Field and Source of Funding
Texas Public Institutions of Higher Education

Field	Federal	State Appropriated	Institutionally Controlled	Private	Total
Engineering	$ 62,982,886	$ 40,664,012	$15,131,317	$ 26,368,436	$145,146,651
Physical Sciences	61,764,956	17,140,273	8,148,607	13,718,842	100,772,678
Environmental Sciences	56,279,101	10,804,150	8,176,819	10,371,262	85,631,332
Mathematical Sciences	4,016,266	3,073,965	640,829	170,212	7,901,272
Computer Science	14,007,845	1,609,259	7,265,703	1,699,441	24,582,248
Medical Sciences	150,994,633	40,848,622	10,297,076	61,691,127	263,831,458
Agricultural Sciences	9,456,679	17,757,206	8,001,776	8,625,462	43,841,123
Biological and Other Life Sciences	52,498,928	50,063,838	17,946,547	15,456,711	135,966,024
Psychology	3,464,179	676,349	350,385	544,579	5,035,492
Social Sciences	4,865,344	9,220,654	1,424,146	2,726,295	18,236,439
Other Sciences	295,797	578,879	288,365	191,808	1,354,849
Arts and Humanities	1,406,451	445,525	2,617,669	2,130,138	6,599,783
Business Administration	4,242,744	2,109,791	1,065,456	1,675,652	9,093,643
Education	3,468,602	765,526	557,462	941,357	5,732,947
Law and Public Administration	512,884	1,073,262	2,395,555	958,814	4,940,515
Other Non-Science Activities	1,561,077	139,323	539,015	458,665	2,698,080
Totals	$431,818,372	$196,970,634	$84,846,727	$147,728,801	$861,364,534

Table 1 and Figure 5 describe expenditures in 16 different fields. For a complete definition of each of these fields, see Appendix A. For the most part, these expenditures correspond to research expenditures in academic disciplines, although not necessarily. For example, an engineering college could do research in applied mathematics, and the expenditure should be reported under mathematical sciences. A College of Agriculture could do basic research in biological sciences and report expenditures in that field rather than in Agricultural Sciences. In arriving at these figures, institutions were asked to classify each project as belonging to one specific field so that no double-counting would occur.

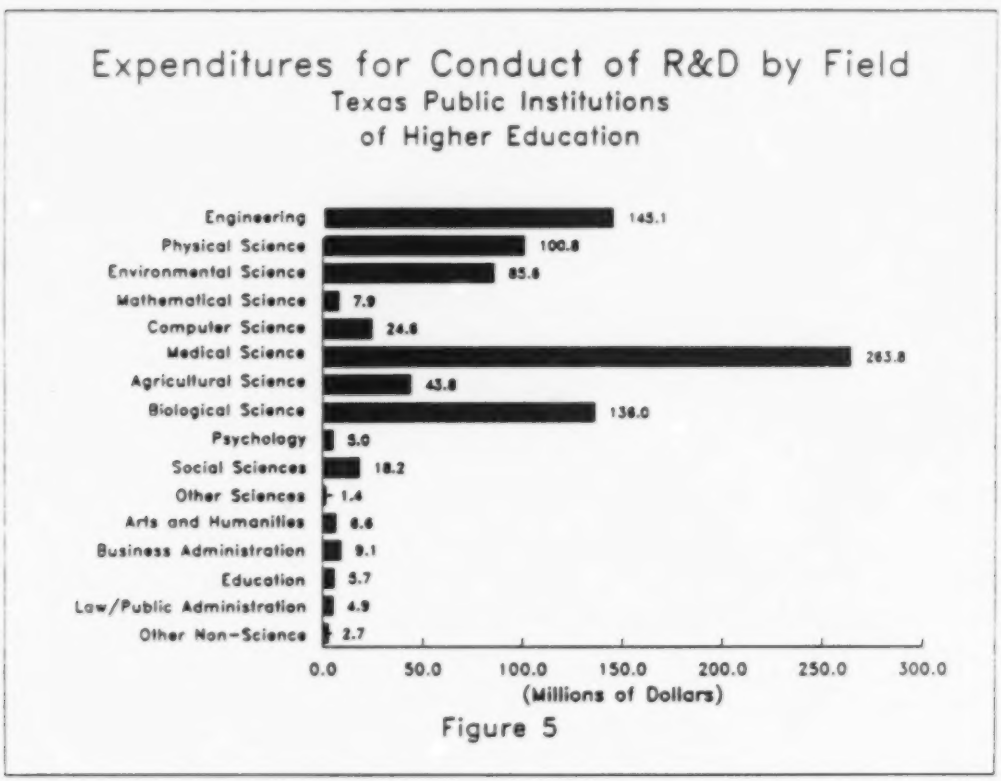


Figure 5

Figure 6 and Table 2 describe research in 10 different areas of special interest. Institutions reported considerable difficulty in developing these figures for two reasons: many projects can correctly be classified as being relevant to two or more of these areas; and the relevance to any of these areas is not always known when the project is acquired, especially by grant administration personnel. In reporting these data, double-counting was allowed.

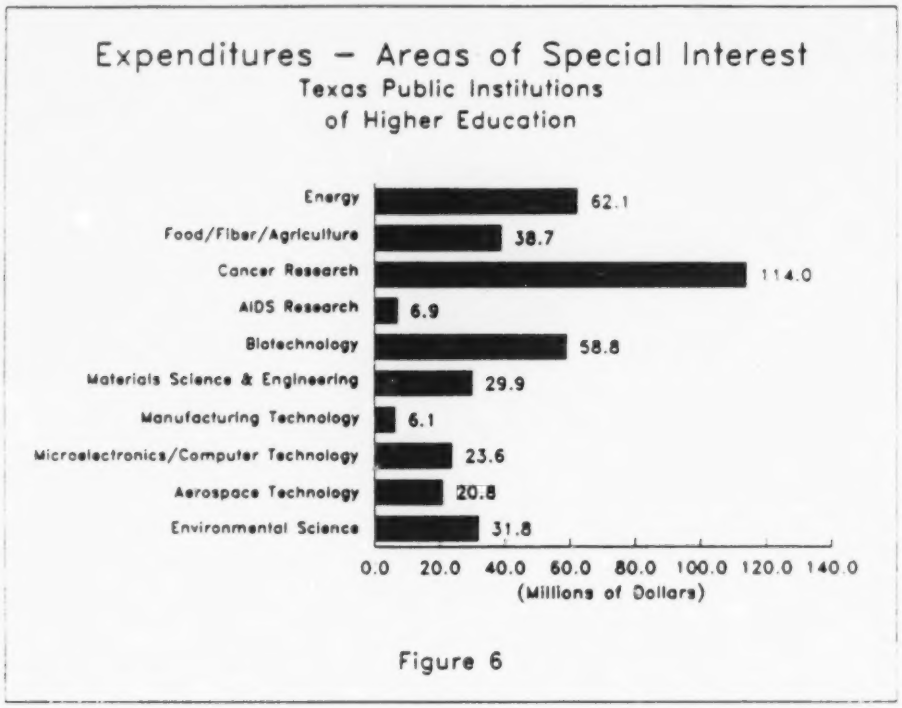


Figure 6

Table 2

Expenditures for Conduct of R&D by Area of Special Interest and Source
Texas Public Institutions of Higher Education

Area of Special Interest	Federal	State Appropriated	Institutionally Controlled	Private	Total
Energy	$ 31,600,653	$ 14,609,359	$ 3,355,175	$12,497,877	$ 62,063,064
Food, fiber, agricultural products	6,323,528	17,457,635	7,027,553	7,894,459	38,703,175
Cancer Research	45,831,952	43,108,239	11,382,900	13,647,513	113,970,604
AIDS Research	3,973,076	1,482,748	17,589	1,388,917	6,862,330
Biotechnology	18,994,288	23,926,751	8,827,270	7,091,700	58,840,009
Materials Science & Engineering	13,625,597	8,962,485	2,882,994	4,398,489	29,869,565
Manufacturing Technology	2,631,438	1,440,014	167,408	1,875,319	6,114,179
Microelectronics & Computer Tech.	13,673,609	3,990,738	3,073,155	2,856,923	23,594,425
Aerospace Technology	15,719,309	1,562,113	1,534,799	1,954,877	20,771,098
Environmental Science & Engineering	14,330,440	6,830,919	1,576,216	9,023,511	31,761,086
Totals	$166,703,890	$123,371,001	$39,845,059	$62,629,585	$392,549,535

Figure 7 and Table 3 describe expenditures for basic and applied research. See Appendix A for the definitions that were used in developing these data. The data should be considered rough approximations at best. Many projects contain elements of both basic and applied research and are difficult to classify. Some researchers and research administrators are reluctant to admit they do anything other than basic research while others take an exceedingly broad view of what constitutes applied research and admit to little basic research.

In developing these data, many institutions used the source of funding as a proxy for the type of research being funded. They assumed that some sponsors, e.g. NSF, support only basic research while others, e.g. industry, support only applied research.

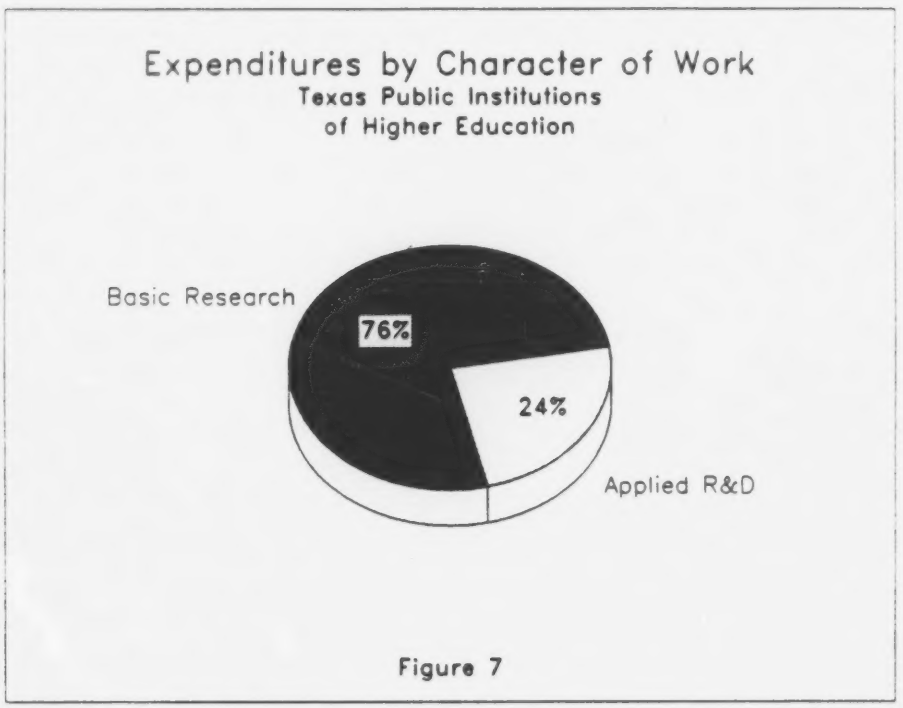


Figure 7

Table 3

Expenditures for Conduct of R&D by Character of Work and Source
Texas Public Institutions of Higher Education

Character of Work	Federal	State Appropriated	Institutionally Controlled	Private	Total
Basic Research	$37,1767,205	$141,891,551	$51,941,319	$84,838,489	$850,438,564
Applied Research & Development	$ 6,0051,167	$ 55,079,083	$32,905,408	$62,890,312	$210,925,970

Figure 8 and Table 4 describe the breakdown between funding derived from a peer-review process and funding derived from a negotiation process. See Appendix A for the definitions that were used in developing these data. The fraction of research derived from a peer review process is an indicator of the quality of research being conducted at a given institution. However, this is only an indicator and must be used with considerable care.

In many cases, it is difficult to classify the process by which contracts and grants are obtained. In some cases contracts are competitively awarded, but follow-up contracts are negotiated. In some cases, contracts are not awarded from a peer-review process, but sponsors have gone through a rigorous selection process to determine potential sources for research support. There are numerous other considerations which make absolute generalizations invalid.

Institutions used different estimators for developing these data, usually using the sponsor as a proxy for the selection process.

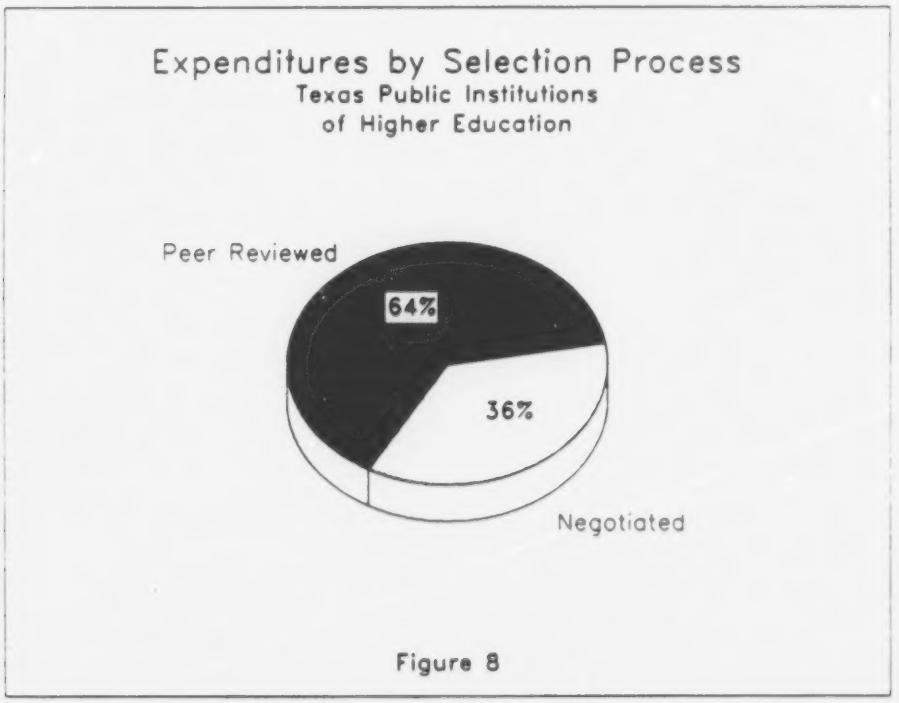


Figure 8

Table 4

Expenditures for Conduct of R&D by Selection Process and Source
Texas Public Institutions of Higher Education

Selection Process	Federal	State Appropriated	Institutionally Controlled	Private	Total
Competitive, Peer Review	$396,291,748	$ 59,058,354	$28,892,344	$66,442,570	$550,685,016
Negotiated or Other	$ 35,526,624	$137,912,280	$55,954,383	$81,286,231	$310,679,518

Institutional Data

This section of the report contains detailed information on research expenditures at individual institutions. Statements related to data quality and applicability found in the previous section of the report also apply to data shown in this section of the report.

Expenditures for Conduct of R&D
Texas Public Universities
Texas A&M University 233.9
University of Texas at Austin 180.6
University of Houston 32.7
Texas Tech University 22.0
University of North Texas 11.8
University of Texas at Dallas 11.3
University of Texas at Arlington 10.1
University of Texas at El Paso 7.4
University of Houston-Clear Lake 6.6
University of Texas at San Antonio 5.1
Prairie View A&M University 3.5
Texas Southern University 3.1
Lamar University 2.8
Texas A&I University 2.6
Texas Woman's University 1.4
Texas A&M University at Galveston 1.3
Stephen F. Austin State University 1.3
Southwest Texas State University 1.3
University of Texas-Pan American 0.6
Sam Houston State University 0.6
Corpus Christi State University 0.6
Angelo State University 0.4
University of Texas of the Permian Basin 0.4
East Texas State University 0.4
Tarleton State University 0.3
University of Texas at Tyler 0.3
West Texas State University 0.3
Sul Ross State University 0.3
University of Houston-Downtown 0.2
Midwestern State University 0.1
Laredo State University 0.0
University of Texas-Pan American-Brownsville 0.0
University of Houston-Victoria 0.0
East Texas State University-Texarkana 0.0
0.0 50.0 100.0 150.0 200.0 250.0 300.0
(Millions of Dollars)

Figure 9

BEST COPY AVAILABLE

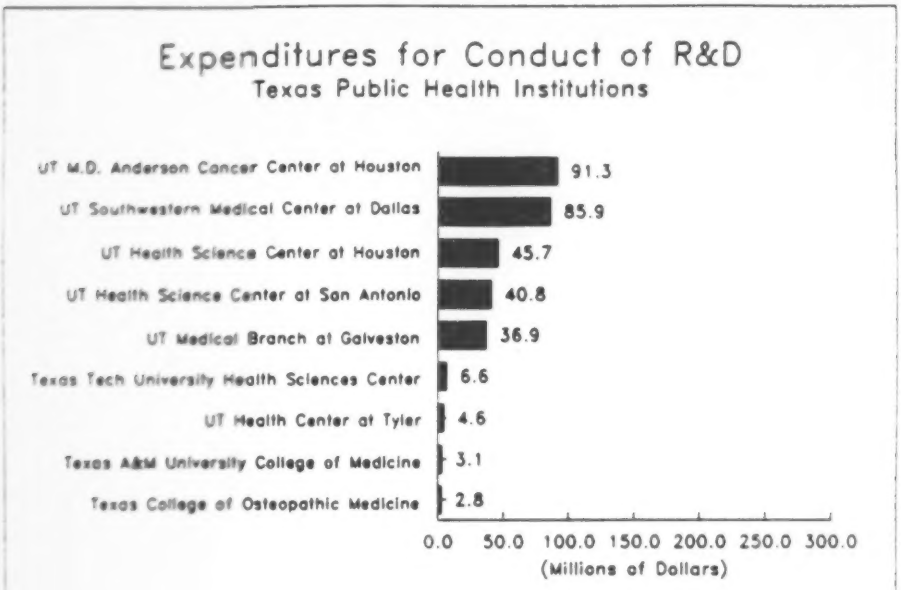


Figure 10

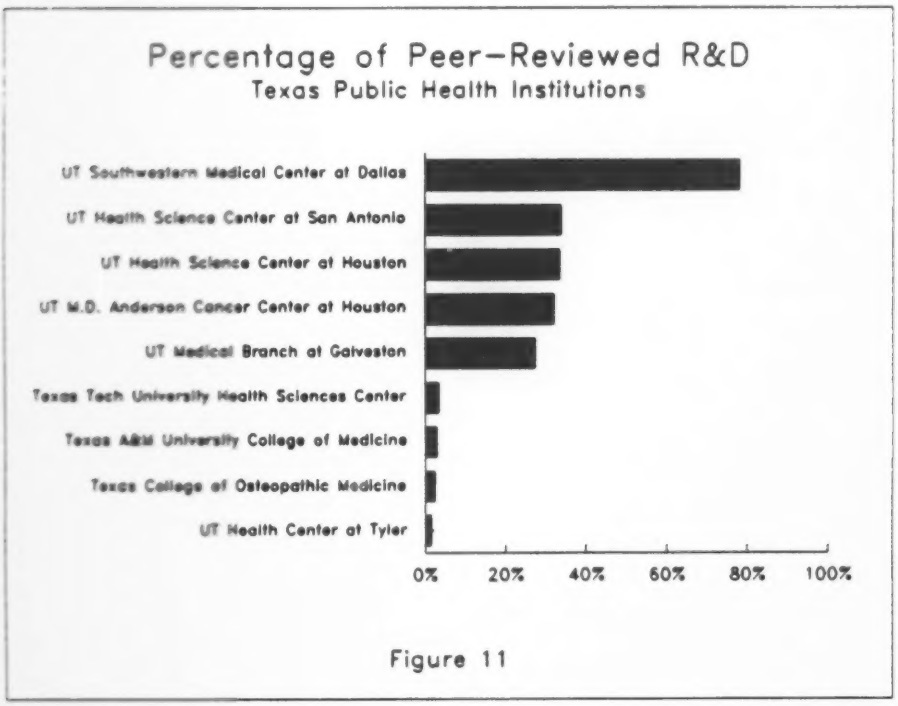

Percentage of Peer-Reviewed R&D
Texas Public Health Institutions
UT Southwestern Medical Center at Dallas
UT Health Science Center at San Antonio
UT Health Science Center at Houston
UT M.D. Anderson Cancer Center at Houston
UT Medical Branch at Galveston
Texas Tech University Health Sciences Center
Texas A&M University College of Medicine
Texas College of Osteopathic Medicine
UT Health Center at Tyler
0% 20% 40% 60% 80% 100%

Figure 11

Percentage of Peer-Reviewed R&D
Texas Public Universities

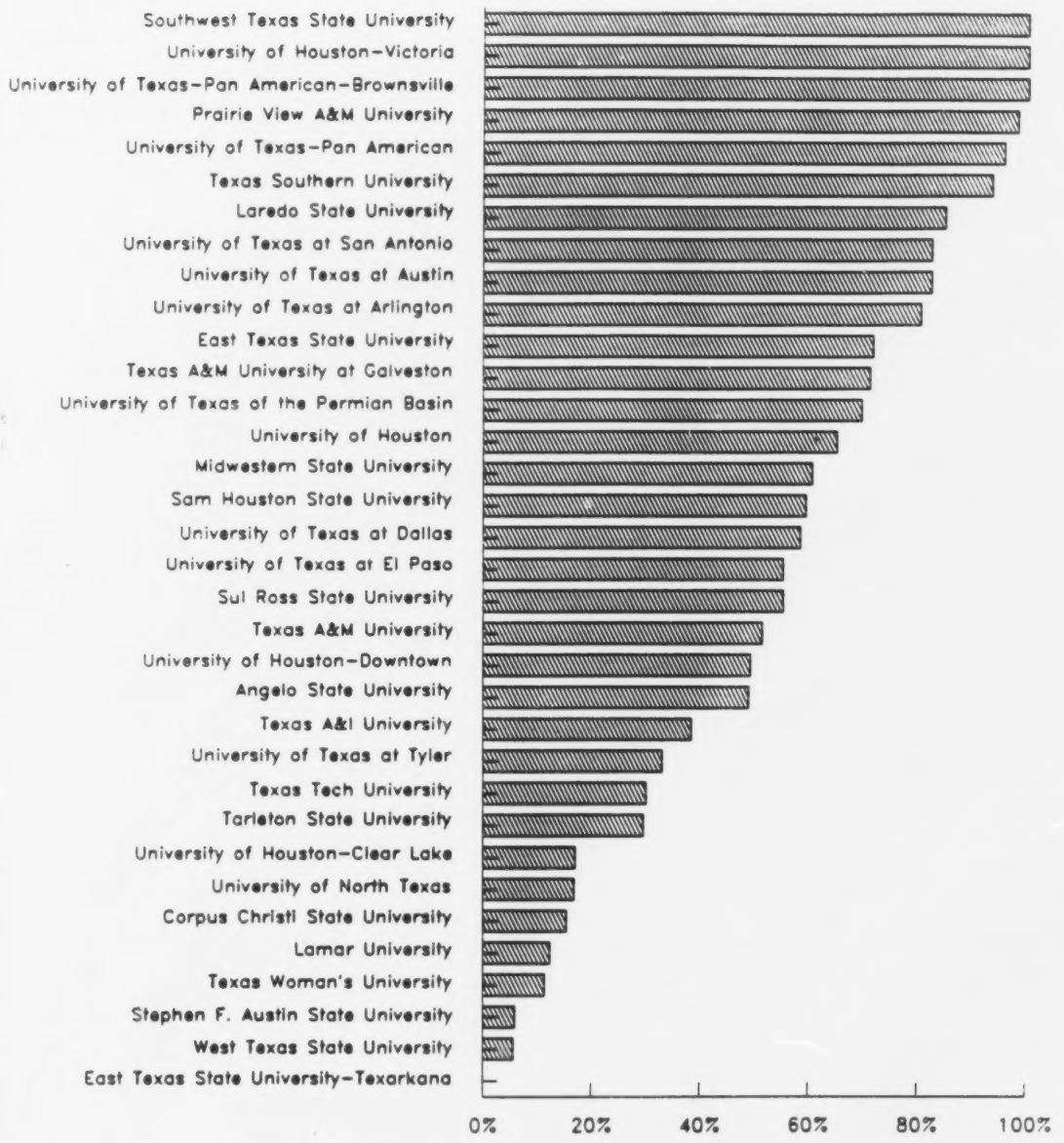


Figure 12

Table 5

Total Expenditures for Sponsored Programs by Source of Funds
Texas Public Institutions of Higher Education

	Federal		State Appropriated		Institutionally Controlled	
	R&D	Other	R&D	Other	R&D	Other
East Texas State Univ	$ 112,666	$ 0	$ 53,728	$ 0	$ 0	$ 0
East Texas State/Texarkana	0	0	0	2,368	0	0
Lamar Univ	2,017,735	416,068	764,022	0	0	0
Midwestern State Univ	66,549	0	8,080	0	0	0
Stephen F. Austin State Univ	289,365	0	671,359	0	174,223	0
Texas A&M Univ System						
Corpus Christi State Univ	120,739	0	400,000	99,537	38,591	0
Laredo State Univ	0	0	28,114	41,488	0	0
Prairie View A&M Univ	3,405,622	2,559,508	89,760	0	0	0
Tarleton State Univ	87,782	0	220,096	0	0	0
Texas A&I Univ	659,571	153,162	987,907	0	0	0
Texas A&M Univ	91,089,415	0	70,690,422	0	36,248,850	0
Texas A&M/Galveston	442,044	0	648,604	0	64,216	0
Texas Southern Univ	2,860,944	0	0	0	0	0
Texas State Univ System						
Angelo State Univ	16,295	0	253,803	0	18,420	0
Sam Houston State Univ	80,320	189,617	262,760	0	75,000	0
Southwest Texas State Univ	660,919	0	271,323	0	117,005	0
Sul Ross State Univ	171,324	0	121,195	0	0	0
Texas Tech Univ	7,206,082	2,016,469	8,672,713	184,288	1,285,379	0
Texas Woman's Univ	476,462	0	611,833	0	76,631	0
The Univ of Texas System						
UT at Arlington	2,136,915	0	5,430,001	0	18,921	0
UT at Austin	102,312,817	8,823,868	27,791,975	208,089	25,779,370	1,016,632
UT at Dallas	5,795,778	0	1,346,028	0	1,729,172	0
UT at El Paso	5,748,899	10,583,355	1,188,297	223,522	153,741	0
UT-Pan American	558,595	0	12,419	0	33,936	0
UT-Pan Am-Brownsville	0	0	0	0	9,301	0
UT-Permian Basin	193,591	2,245	111,057	0	0	7,955
UT at San Antonio	4,101,467	894,929	558,943	476,020	187,388	0
UT at Tyler	2,671	0	126,597	0	184,726	0
Univ of Houston System						
Univ of Houston	17,670,566	8,710,067	9,510,047	4,508,001	957,844	0
Univ of Houston-Clear Lake	6,462,888	684,015	2,958	155,152	0	0
Univ of Houston-Downtown	98,435	0	86,865	0	0	0
Univ of Houston-Victoria	0	64,974	8,172	0	498	0
Univ of North Texas	2,219,382	2,522,811	3,968,444	54,892	2,924,846	2,477,227
West Texas State Univ	19,034	20,923	153,471	0	136,475	133,917
Subtotals	$257,086,892	$37,642,011	$135,050,993	$ 5,953,357	$70,214,533	$3,635,731
TAMU Coll of Medicine	$ 2,334,530	$ 0	$ 155,142	$ 0	$ 4,512	$ 0
Tx Coll of Osteopathic Med	2,031,353	0	185,857	0	0	0
Texas Tech Univ HSC	2,994,857	0	1,381,932	17,931	630,813	0
UT M.D. Anderson Cancer Ctr	28,889,212	0	41,501,614	0	11,121,410	2,394,297
UTMB at Galveston	23,934,032	0	5,490,712	0	121,750	0
UTHSC at Houston	29,017,285	0	4,532,076	0	520,698	0
UT Health Ctr at Tyler	1,290,801	0	1,609,618	0	1,225,938	0
UTHSC at San Antonio	29,431,237	6,076,526	2,241,695	6,360,303	75,677	0
UT Southwestern Med Ctr	54,808,173	2,925,803	4,820,995	13,141,671	931,396	0
Subtotals	$174,731,480	$ 9,002,329	$ 61,919,641	$19,519,905	$14,632,194	$2,394,297
Totals	$431,818,372	$46,644,340	$196,970,634	$25,473,262	$84,846,727	$6,030,028

Table 5 (continued)

Total Expenditures for Sponsored Programs by Source of Funds
Texas Public Institutions of Higher Education

	Private		Total		
	R&D	Other	R&D	Other	Total
East Texas State Univ	$ 197,105	$ 0	$ 363,499	$ 0	$ 363,499
East Texas State/Texarkana	0	0	0	2,368	2,368
Lamar Univ	57,737	0	2,839,494	416,068	3,255,562
Midwestern State Univ	35,195	0	109,824	0	109,824
Stephen F. Austin State Univ	181,266	0	1,316,213	0	1,316,213
Texas A&M Univ System					
Corpus Christi State Univ	34,721	42,200	594,051	141,737	735,788
Laredo State Univ	5,000	0	33,114	41,488	74,602
Prairie View A&M Univ	25,466	0	3,520,848	2,559,508	6,080,356
Tarleton State Univ	28,082	0	335,960	0	335,960
Texas A&I Univ	909,909	1,195	2,557,387	154,357	2,711,744
Texas A&M Univ	35,911,083	0	233,939,770	0	233,939,770
Texas A&M/Galveston	171,106	0	1,325,970	0	1,325,970
Texas Southern Univ	201,620	0	3,062,564	0	3,062,564
Texas State Univ System					
Angelo State Univ	149,538	0	438,056	0	438,056
Sam Houston State Univ	221,160	0	639,240	189,617	828,857
Southwest Texas State Univ	255,496	0	1,304,743	0	1,304,743
Sul Ross State Univ	17,589	0	310,108	0	310,108
Texas Tech Univ	4,868,845	3,892,226	22,035,019	6,092,983	28,128,002
Texas Woman's Univ	265,912	0	1,430,838	0	1,430,838
The Univ of Texas System					
UT at Arlington	2,480,191	0	10,066,028	0	10,066,028
UT at Austin	24,743,233	9,965	180,627,395	10,058,554	190,685,949
UT at Dallas	2,420,753	0	11,291,731	0	11,291,731
UT at El Paso	344,147	540,248	7,435,084	11,347,125	18,782,209
UT-Pan American	42,092	0	647,042	0	647,042
UT-Pan Am-Brownsville	1,343	0	10,644	0	10,644
UT-Permian Basin	111,287	24,635	415,935	34,835	450,770
UT at San Antonio	268,029	148,456	5,115,847	1,519,405	6,635,252
UT at Tyler	17,643	0	331,637	0	331,637
Univ of Houston System					
Univ of Houston	4,525,513	3,137,905	32,663,970	16,355,973	49,019,943
Univ of Houston-Clear Lake	139,954	120,146	6,605,800	959,313	7,565,113
Univ of Houston-Downtown	13,596	0	198,896	0	198,896
Univ of Houston-Victoria	0	0	8,670	64,974	73,644
Univ of North Texas	2,684,954	3,249,536	11,797,626	8,304,466	20,102,092
West Texas State Univ	18,326	62,938	327,306	217,778	545,084
Subtotals	$ 81,347,891	$11,229,450	$543,700,309	$58,460,549	$602,160,858
TAMU Coll of Medicine	$ 635,437	$ 0	$ 3,129,621	$ 0	$ 3,129,621
Tx Coll of Osteopathic Med	550,291	0	2,767,501	0	2,767,501
Texas Tech Univ HSC	1,597,989	0	6,605,591	17,931	6,623,522
UT M.D. Anderson Cancer Ctr	9,771,247	0	91,283,483	2,394,297	93,677,780
UTMB at Galveston	7,309,919	0	36,856,413	0	36,856,413
UTHSC at Houston	11,637,561	0	45,707,620	0	45,707,620
UT Health Ctr at Tyler	431,167	0	4,557,524	0	4,557,524
UTHSC at San Antonio	9,089,126	2,694,785	40,837,735	15,131,614	55,969,349
UT Southwestern Med Ctr	25,358,173	7,808,299	85,918,737	23,875,773	109,794,510
Subtotals	$ 66,380,910	$10,503,084	$317,664,225	$41,419,615	$359,083,840
Totals	$147,728,801	$21,732,534	$861,364,534	$99,880,164	$961,244,698

Table 6

Expenditures for Conduct of R&D by Field
Texas Public Institutions of Higher Education

	Engineering	Physical Sciences	Environmental Sciences	Mathematical Sciences	Computer Science	Medical Sciences	Agricultural Sciences	Biological & Other Life Sciences
East Texas State Univ	$ 0	$ 200,261	$ 0	$ 0	$ 350	$ 0	$ 52,097	$ 650
East Texas State/Texarkana	0	0	0	0	0	0	0	0
Lamar Univ	1,767,860	128,227	88,335	52,027	16,777	4,499	0	9,624
Midwestern State Univ	0	50,858	0	0	0	0	0	6,139
Stephen F. Austin State Univ	0	172,049	10,490	0	18,802	0	78,307	8,439
Texas A&M Univ System								
Corpus Christi State Univ	0	471,700	66,594	0	0	0	0	0
Laredo State Univ	0	0	0	0	0	5,000	0	0
Prairie View A&M Univ	120,830	19,455	373,576	0	0	0	2,598,136	319,503
Tarleton State Univ	0	49,443	252,128	0	0	0	762	982
Texas A&I Univ	245,765	58,874	6,227	0	10,593	0	1,988,504	234,610
Texas A&M Univ	55,787,706	16,546,040	55,821,774	1,246,437	3,851,882	1,339,075	32,386,508	53,963,548
Texas A&M/Galveston	0	121,512	1,049,503	0	0	0	0	143,973
Texas Southern Univ	0	1,606,689	0	83,910	57,022	0	0	1,145,146
Texas State Univ System								
Angelo State Univ	0	159,660	0	0	0	0	223,209	55,187
Sam Houston State Univ	257,889	11,089	0	0	10,549	0	23,298	47,141
Southwest Texas State U	0	408,644	0	9,614	2,500	3,752	39,185	319,252
Sul Ross State Univ	0	0	70,979	0	0	0	18,614	212,500
Texas Tech Univ	6,699,955	2,622,858	645,295	225,593	222,948	2,543	6,401,278	953,518
Texas Woman's Univ	0	37,631	0	1,971	0	154,038	0	1,148,013
The Univ of Texas System								
UT at Arlington	5,188,023	2,305,188	279,527	97,222	676,638	195,300	0	760,517
UT at Austin	63,584,415	44,556,320	21,592,864	1,021,015	11,390,378	4,029,786	0	13,029,189
UT at Dallas	722,669	5,325,731	1,499,354	159,096	541,533	980,622	0	973,233
UT at El Paso	3,201,695	1,176,380	688,094	100,723	311,188	7,224	0	971,535
UT-Pan American	14,184	0	14,464	73,379	0	139,839	0	214,616
UT-Pan Am-Brownsville	0	0	0	0	0	0	0	0
UT-Permian Basin	27,651	19,351	0	0	0	0	0	0
UT at San Antonio	415,267	210,194	121,903	198,681	142,946	0	0	1,794,189
UT at Tyler	0	0	0	0	16,411	10,567	0	8,633
Univ of Houston System								
Univ of Houston	6,572,189	17,568,797	1,115,866	693,786	158,143	2,090,676	0	1,389,888
Univ of Houston-Clear Lake	0	11,199	0	0	6,308,882	0	31,225	205,798
Univ of Houston-Downtown	3,603	815	0	30,431	153,716	0	0	1,373
Univ of Houston-Victoria	0	0	0	83	183	0	0	0
Univ of North Texas	209,644	2,825,058	1,424,963	1,549,332	684,642	0	0	2,344,586
West Texas State Univ	327,306	0	0	0	0	0	0	0
Subtotals	$145,146,651	$ 96,666,023	$85,121,936	$5,543,300	$24,576,083	$ 8,962,921	$43,841,123	$ 80,261,782
TAMU Coll of Medicine	$ 0	$ 0	$ 0	$ 0	$ 0	$ 1,592,386	$ 0	$ 1,537,235
Tx Coll of Osteopathic Med	0	0	0	0	0	2,566,298	0	89,945
Texas Tech Univ HSC	0	0	0	0	0	3,940,899	0	2,664,692
UT M.D. Anderson Cancer	0	4,106,655	0	2,357,972	0	45,774,265	0	39,044,591
UTMB at Galveston	0	0	0	0	0	36,856,413	0	0
UTHSC at Houston	0	0	509,396	0	0	33,168,302	0	12,029,922
UT Health Ctr at Tyler	0	0	0	0	6,165	4,551,359	0	0
UTHSC at San Antonio	0	0	0	0	0	40,837,735	0	0
UT Southwestern Med Ctr	0	0	0	0	0	85,580,880	0	337,857
Subtotals	$ 0	$ 4,106,655	$ 509,396	$2,357,972	$ 6,165	$254,868,537	$ 0	$ 55,704,242
Totals	$145,146,651	$100,772,678	$85,631,332	$7,901,272	$24,582,248	$263,831,458	$43,841,123	$135,966,024

Table 6 (continued)

Expenditures for Conduct of R&D by Field
Texas Public Institutions of Higher Education

	Psychology	Social Sciences	Arts & Humanities	Business Administration	Education	Law & Public Administration	Other	Total
East Texas State Univ	$ 0	$ 25,505	$ 29,142	$ 2,000	$ 53,494	$ 0	$ 0	$ 363,499
East Texas State/Texarkana	0	0	0	0	0	0	0	0
Lamar Univ	18,519	35,266	8,900	708,421	1,039	0	0	2,839,494
Midwestern State Univ	0	12,155	0	0	9,850	30,822	0	109,824
Stephen F. Austin State Univ	26,119	67,539	10,756	12,595	0	0	911,117	1,316,213
Texas A&M Univ System								
Corpus Christi State Univ	0	2,278	43,135	10,344	0	0	0	594,051
Laredo State Univ	0	4,768	0	23,346	0	0	0	33,114
Prairie View A&M Univ	0	89,348	0	0	0	0	0	3,520,848
Tarleton State Univ	0	5,263	21,457	5,925	0	0	0	335,960
Texas A&I Univ	1,475	2,905	0	0	358	0	8,076	2,557,387
Texas A&M Univ	526,852	9,744,688	228,758	416,739	569,579	1,510,184	0	233,939,770
Texas A&M/Galveston	0	0	10,982	0	0	0	0	1,325,970
Texas Southern Univ	0	0	0	0	60,000	107,797	0	3,062,564
Texas State Univ System								
Angelo State Univ	0	0	0	0	0	0	0	438,056
Sam Houston State Univ	12,518	231,130	11,223	16,524	17,879	0	0	639,240
Southwest Texas State U	200,729	63,321	128,984	16,490	111,001	1,271	0	1,304,743
Sul Ross State Univ	0	0	0	1,631	6,384	0	0	310,108
Texas Tech Univ	51,297	2,090,791	96,115	1,384,996	415,584	122,248	100,000	22,035,019
Texas Woman's Univ	869	1,498	3,650	896	82,272	0	0	1,430,838
The Univ of Texas System								
UT at Arlington	232,378	236,024	41,626	53,287	0	298	0	10,066,028
UT at Austin	1,819,820	2,656,491	5,103,845	2,922,852	3,135,600	3,022,716	2,762,104	180,627,395
UT at Dallas	217,839	395,345	173,899	285,012	17,398	0	0	11,291,731
UT at El Paso	219,971	274,219	50,564	432,575	776	140	0	7,435,084
UT-Pan American	19,809	143,831	0	20,224	5,642	1,054	0	647,042
UT-Pan Am-Brownsville	0	10,644	0	0	0	0	0	10,644
UT-Permian Basin	2,689	0	0	316,461	0	49,783	0	415,935
UT at San Antonio	2,055	247,857	9,644	1,960,447	12,664	0	0	5,115,847
UT at Tyler	145,988	44,398	1,306	2,902	97,218	4,214	0	331,637
Univ of Houston System								
Univ of Houston	1,381,164	526,017	307,549	17,871	563,113	15,484	263,427	32,663,970
Univ of Houston-Clear Lake	23,295	0	6,388	94	17,830	1,089	0	6,605,800
Univ of Houston-Downtown	0	0	5,159	2,943	0	856	0	198,896
Univ of Houston-Victoria	184	0	5,503	184	2,533	0	0	8,670
Univ of North Texas	131,922	1,325,158	301,198	478,884	449,680	72,559	0	11,797,626
West Texas State Univ	0	0	0	0	0	0	0	327,306
Subtotals	$5,035,492	$18,236,439	$6,599,783	$9,093,643	$5,629,894	$4,940,515	$4,044,724	$543,700,309
TAMU Coll of Medicine	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 0	$ 3,129,621
Tx Coll of Osteopathic Med	0	0	0	0	103,053	0	8,205	2,767,501
Texas Tech Univ HSC	0	0	0	0	0	0	0	6,605,591
UT M.D. Anderson Cancer	0	0	0	0	0	0	0	91,283,483
UTMB at Galveston	0	0	0	0	0	0	0	36,856,413
UTHSC at Houston	0	0	0	0	0	0	0	45,707,620
UT Health Ctr at Tyler	0	0	0	0	0	0	0	4,557,524
UTHSC at San Antonio	0	0	0	0	0	0	0	40,837,735
UT Southwestern Med Ctr	0	0	0	0	0	0	0	85,918,737
Subtotals	$ 0	$ 0	$ 0	$ 0	$ 103,053	$ 0	$ 8,205	$317,664,225
Totals	$5,035,492	$18,236,439	$6,599,783	$9,093,643	$5,732,947	$4,940,515	$4,052,929	$861,364,534

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Table 7

Expenditures for Conduct of R&D by Area of Special Interest
Texas Public Institutions of Higher Education

	Energy	Food, Fiber, Agricultural Products	Cancer Research	AIDS Research	Biotechnology	Materials Science & Engineering
East Texas State Univ	$ 0	$ 52,097	$ 0	$ 0	$ 500	$ 0
East Texas State/Texarkana	0	0	0	0	0	0
Lamar Univ	10,076	0	0	0	4,000	9,648
Midwestern State Univ	0	0	0	0	0	0
Stephen F. Austin State Univ	0	0	0	0	0	0
Texas A&M Univ System						
Corpus Christi State Univ	0	0	0	0	0	0
Laredo State Univ	0	0	0	0	0	0
Prairie View A&M Univ	481,699	248,383	0	319,503	114,728	0
Tarleton State Univ	0	0	0	0	0	0
Texas A&I Univ	95,114	939,250	0	0	235,385	0
Texas A&M Univ	6,941,279	29,869,261	1,105,341	273,419	40,128,646	3,831,876
Texas A&M/Galveston	0	0	0	0	0	0
Texas Southern Univ	208,567	59,368	268,341	0	0	125,000
Texas State Univ System						
Angelo State Univ	0	223,209	12,105	0	141,329	0
Sam Houston State Univ	0	11,956	0	0	0	109,522
Southwest Texas State Univ	0	0	0	0	0	0
Sul Ross State Univ	0	18,614	0	0	0	0
Texas Tech Univ	837,565	6,101,985	78,660	0	766,041	2,177,732
Texas Woman's Univ	0	694,306	0	0	0	0
The Univ of Texas System						
UT at Arlington	759,190	0	0	424,415	1,847,428	2,436,326
UT at Austin	38,057,666	242,681	2,359,659	156,722	3,614,959	6,286,796
UT at Dallas	578,990	0	141	5,000	1,727,379	193,461
UT at El Paso	299,788	0	0	0	0	1,757,256
UT-Pan American	0	0	0	0	0	0
UT-Pan Am-Brownsville	0	0	0	0	0	0
UT-Permian Basin	23,892	29,063	0	0	2,689	3,759
UT at San Antonio	0	0	0	0	0	15,130
UT at Tyler	0	0	0	0	0	0
Univ of Houston System						
Univ of Houston	13,403,567	116,395	2,539,990	388,533	4,270,503	12,014,777
Univ of Houston-Clear Lake	461	0	0	0	111,238	0
Univ of Houston-Downtown	0	0	0	0	0	0
Univ of Houston-Victoria	0	0	0	0	0	0
Univ of North Texas	37,904	94,274	0	0	722,883	908,282
West Texas State Univ	327,306	0	0	0	0	0
Subtotals	$62,063,064	$38,700,842	$ 6,364,237	$1,567,592	$53,687,708	$29,869,565
TAMU Coll of Medicine	$ 0	$ 2,333	$ 208,116	$ 234,162	$ 0	$ 0
Tx Coll of Osteopathic Med	0	0	163,177	368	0	0
Texas Tech Univ HSC	0	0	234,002	22,990	177,053	0
UT M.D. Anderson Cancer Ctr	0	0	91,283,483	0	0	0
UTMB at Galveston	0	0	1,890,950	1,995,839	4,286,413	0
UTHSC at Houston	0	0	2,884,456	1,491,826	688,835	0
UT Health Ctr at Tyler	0	0	0	0	0	0
UTHSC at San Antonio	0	0	4,636,996	0	0	0
UT Southwestern Med Ctr	0	0	6,305,187	1,549,553	0	0
Subtotals	$ 0	$ 2,333	$107,606,367	$5,294,738	$ 5,152,301	$ 0
Totals	$62,063,064	$38,703,175	$113,970,604	$6,862,330	$58,840,009	$29,869,565

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Table 7 (continued)

Expenditures for Conduct of R&D by Area of Special Interest
Texas Public Institutions of Higher Education

	Manufacturing Technology	Microelectronics & Computer Technology	Aerospace Technology	Environmental Science & Engineering	Total
East Texas State Univ	$ 0	$ 87,000	$ 0	$ 0	$ 139,597
East Texas State/Texarkana	0	0	0	0	0
Lamar Univ	0	14,475	76,193	1,858,107	1,972,499
Midwestern State Univ	0	0	0	0	0
Stephen F. Austin State Univ	0	18,802	18,451	10,490	47,743
Texas A&M Univ System					
Corpus Christi State Univ	0	0	0	66,594	66,594
Laredo State Univ	0	0	0	0	0
Prairie View A&M Univ	0	0	21,957	0	1,186,270
Tarleton State Univ	0	0	0	0	0
Texas A&I Univ	0	0	0	0	1,269,749
Texas A&M Univ	1,510,126	3,604,341	4,604,071	13,477,779	105,346,139
Texas A&M/Galveston	0	0	0	1,049,503	1,049,503
Texas Southern Univ	0	57,022	0	416,656	1,134,954
Texas State Univ System					
Angelo State Univ	0	0	0	17,433	394,076
Sam Houston State Univ	0	10,301	0	39,410	171,189
Southwest Texas State Univ	0	0	0	0	0
Sul Ross State Univ	0	59,978	0	11,001	89,593
Texas Tech Univ	762,185	1,309,365	236,641	2,390,271	14,660,445
Texas Woman's Univ	0	0	0	0	694,306
The Univ of Texas System					
UT at Arlington	1,134,438	705,899	352,489	0	7,660,185
UT at Austin	1,481,060	8,418,233	4,775,951	4,824,905	70,218,632
UT at Dallas	130,644	935,417	4,334,593	1,995,032	9,900,657
UT at El Paso	759,218	220,737	25,062	595,855	3,657,916
UT-Pan American	0	0	72,635	14,464	87,099
UT-Pan Am-Brownsville	0	0	0	0	0
UT-Permian Basin	172,371	0	0	19,351	251,125
UT at San Antonio	0	142,946	0	576,759	734,835
UT at Tyler	0	16,411	0	0	16,411
Univ of Houston System					
Univ of Houston	163,111	1,186,650	5,794,726	2,237,514	42,115,766
Univ of Houston-Clear Lake	0	6,302,748	0	0	6,414,447
Univ of Houston-Downtown	0	115,928	57,862	0	173,790
Univ of Houston-Victoria	0	0	0	0	0
Univ of North Texas	1,026	388,172	0	1,424,963	3,577,504
West Texas State Univ	0	0	0	0	327,306
Subtotals	$6,114,179	$23,594,425	$20,370,631	$31,026,087	$273,358,330
TAMU Coll of Medicine	$ 0	$ 0	$ 0	$ 0	$ 444,611
Tx Coll of Osteopathic Med	0	0	0	0	163,545
Texas Tech Univ HSC	0	0	0	0	434,045
UT M.D. Anderson Cancer Ctr	0	0	0	0	91,283,483
UTMB at Galveston	0	0	400,467	734,999	9,308,668
UTHSC at Houston	0	0	0	0	5,065,117
UT Health Ctr at Tyler	0	0	0	0	0
UTHSC at San Antonio	0	0	0	0	4,636,996
UT Southwestern Med Ctr	0	0	0	0	7,854,740
Subtotals	$ 0	$ 0	$ 400,467	$ 734,999	$119,191,205
Totals	$6,114,179	$23,594,425	$20,771,098	$31,761,086	$392,549,535

Table 8

Expenditures for Conduct of R&D by Character of Work
Texas Public Institutions of Higher Education

	Basic	Applied R&D	Total
East Texas State Univ	$ 30,500	$ 332,999	$ 363,499
East Texas State/Texarkana	0	0	0
Lamar Univ	7,742	2,831,752	2,839,494
Midwestern State Univ	66,549	43,275	109,824
Stephen F. Austin State Univ	1,316,213	0	1,316,213
Texas A&M Univ System			
Corpus Christi State Univ	43,435	550,616	594,051
Laredo State Univ	0	33,114	33,114
Prairie View A&M Univ	3,456,656	64,192	3,520,848
Tarleton State Univ	102,382	233,578	335,960
Texas A&I Univ	912,884	1,644,503	2,557,387
Texas A&M Univ	162,834,285	71,105,485	233,939,770
Texas A&M/Galveston	1,203,761	122,209	1,325,970
Texas Southern Univ	1,917,418	1,145,146	3,062,564
Texas State Univ System			
Angelo State Univ	203,193	234,863	438,056
Sam Houston State Univ	381,023	258,217	639,240
Southwest Texas State Univ	0	1,304,743	1,304,743
Sul Ross State Univ	310,108	0	310,108
Texas Tech Univ	12,169,722	9,865,297	22,035,019
Texas Woman's Univ	226,387	1,204,451	1,430,838
The Univ of Texas System			
UT at Arlington	4,867,352	5,198,676	10,066,028
UT at Austin	166,771,185	13,856,210	180,627,395
UT at Dallas	10,931,369	360,362	11,291,731
UT at El Paso	4,405,295	3,029,789	7,435,084
UT-Pan American	0	647,042	647,042
UT-Pan Am-Brownsville	0	10,644	10,644
UT-Permian Basin	247,272	168,663	415,935
UT at San Antonio	4,795,389	320,458	5,115,847
UT at Tyler	321,069	10,568	331,637
Univ of Houston System			
Univ of Houston	28,252,704	4,411,266	32,663,970
Univ of Houston-Clear Lake	6,548,886	56,914	6,605,800
Univ of Houston-Downtown	23,891	175,205	198,896
Univ of Houston-Victoria	0	8,670	8,670
Univ of North Texas	5,868,565	5,929,061	11,797,626
West Texas State Univ	0	327,306	327,306
Subtotals	$418,215,035	$125,485,274	$543,700,309
TAMU Coll of Medicine	$ 2,896,564	$ 233,057	$ 3,129,621
Tx Coll of Osteopathic Med	2,371,988	395,513	2,767,501
Texas Tech Univ HSC	5,291,578	1,314,013	6,605,591
UT M.D. Anderson Cancer Ctr	54,429,432	36,854,051	91,283,483
UTMB at Galveston	27,273,746	9,582,667	36,856,413
UTHSC at Houston	10,078,575	35,629,045	45,707,620
UT Health Ctr at Tyler	4,157,513	400,011	4,557,524
UTHSC at San Antonio	40,837,735	0	40,837,735
UT Southwestern Med Ctr	84,886,398	1,032,339	85,918,737
Subtotals	$232,223,529	$ 85,440,696	$317,664,225
Totals	$650,438,564	$210,925,970	$861,364,534

Historical Data

Because many individual data items have been changed for this report and because many data items have been more-rigorously defined, meaningful comparisons with data from previous years cannot be made in many cases.

The only comparative data that is provided is that of total research expenditures. Because a more-precise and more conservative definition of what constitutes a research activity has been adopted, research expenditures for fiscal year 1990 are probably understated, relative to expenditures reported in previous years.

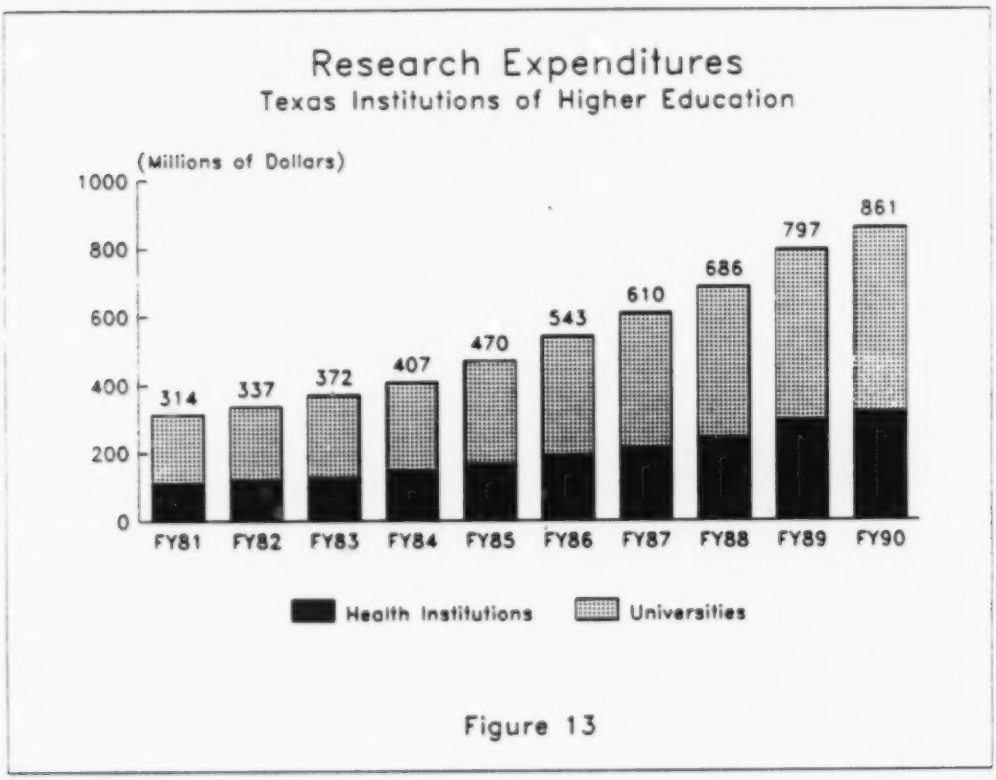

Figure 13

Table 9

Comparison of 1989 and 1990 Research Expenditures
Texas Public Institutions of Higher Education

	1989	1990	Percent Change
East Texas State Univ	$ 464,272	$ 363,499	-21 71
East Texas State/Texarkana	2,331	0	-100 00
Lamar Univ	799,443	2,839,494	255 18
Midwestern State Univ	74,582	109,824	47 25
Stephen F. Austin State Univ	1,174,656	1,316,213	12 05
Texas A&M Univ System			
Corpus Christi State Univ	454,908	594,051	30 59
Laredo State Univ	868	33,114	3,714 98
Prairie View A&M Univ	6,005,883	3,520,848	-41 38
Tarleton State Univ	39,466	335,960	751 26
Texas A&I Univ	2,991,945	2,557,387	-14 52
Texas A&M Univ	215,571,489	233,939,770	8 52
Texas A&M/Galveston	626,897	1,325,970	111 51
Texas Southern Univ	1,822,881	3,062,564	68 01
Texas State Univ System			
Angelo State Univ	241,190	438,056	81 62
Sam Houston State Univ	341,056	639,240	87 43
Southwest Texas State Univ	882,259	1,304,743	47 89
Sul Ross State Univ	215,584	310,108	43 85
Texas Tech Univ	21,898,524	22,035,019	0 62
Texas Woman's Univ	1,100,234	1,430,838	30 05
The Univ of Texas System			
UT at Arlington	7,999,792	10,066,028	25 83
UT at Austin	162,087,506	180,627,395	11 44
UT at Dallas	11,222,614	11,291,731	0 62
UT at El Paso	3,896,992	7,435,084	90 79
UT-Pan American	491,320	647,042	31 69
UT-Pan Am-Brownsville	15,143	10,644	-29 71
UT-Permian Basin	459,909	415,935	-9 56
UT at San Antonio	4,545,654	5,115,847	12 54
UT at Tyler	256,048	331,637	29 52
Univ of Houston System			
Univ of Houston	36,593,587	32,663,970	-10 74
Univ of Houston-Clear Lake	6,348,466	6,605,800	4 05
Univ of Houston-Downtown	43,674	198,896	355 41
Univ of Houston-Victoria	5,117	8,670	69 44
Univ of North Texas	10,969,502	11,797,626	7 55
West Texas State Univ	596,746	327,306	-45 15
Subtotals	$500,240,538	$543,700,309	8 69
TAMU Coll of Medicine	$ 2,766,838	$ 3,129,621	13 11
Tx Coll of Osteopathic Med	3,705,082	2,767,501	-25 31
Texas Tech Univ HSC	6,894,615	6,605,591	-4 19
UT M.D. Anderson Cancer Ctr	85,902,849	91,283,483	6 26
UTMB at Galveston	33,588,574	36,856,413	9 73
UTHSC at Houston	38,147,473	45,707,620	19 82
UT Health Ctr at Tyler	4,819,343	4,557,524	-5 43
UTHSC at San Antonio	40,659,937	40,837,735	0 44
UT Southwestern Med Ctr	79,920,125	85,918,737	7 51
Subtotals	$296,404,836	$317,664,225	7 17
Totals	$796,645,374	$861,364,534	8 12

Appendix A

TEXAS HIGHER EDUCATION COORDINATING BOARD

SURVEY OF RESEARCH EXPENDITURES

Fiscal Year 1990

INFORMATION SUPPLIED BY

NAME _____

TITLE _____

INSTITUTION _____

ADDRESS _____

CITY _____

STATE Texas ZIP _____

TELEPHONE (_____) _____

********** Completed form should be returned by December 1, 1990 **********

Return completed form to: Educational Data Center
Texas Higher Education Coordinating Board
P. O. Box 12788
Austin, TX 78711-2788

ABOUT THIS SURVEY

This is an annual survey conducted by the Texas Higher Education Coordinating Board. It is mandated by the Texas Legislature, and it is the basis for an annual report of research expenditures at Texas institutions of higher education.

The report is widely used by institutions of higher education and other state agencies, and excerpts from the report are widely reported in the press. In addition, the data provides the basis for many far-reaching policy and management decisions. It is critical that the data be reported accurately and completely.

This report should be consistent with the Annual Financial Report of the institution. Refer to College and University Business Administration, NACUBO.

The report includes only separately budgeted and accounted for expenditures and does not include research done by faculty members as a regular part of their academic duties.

The data collection form and definitions are modeled after similar forms used by the National Science Foundation in an effort to provide comparability of data with national data and to reduce the data collection efforts of the institutions.

Institutions are encouraged to submit their data in machine-readable form. A blank Lotus 1-2-3 worksheet is provided for those institutions which wish to do this.

GENERAL CONCEPTS AND DEFINITIONS

A. **Research and Development (R&D) activities are defined as follows:**

1. **Research is systematic study directed toward fuller scientific knowledge or understanding of the subject studies. Research is classified as either basic or applied according to the objectives of the sponsoring agency.**

   In **basic research** the objective of the sponsoring agency is to gain fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

   In **applied research** the objective of the sponsoring agency is to gain knowledge or understanding necessary for determining the means by which a recognized and specific need may be met

2. **Development** is systematic use of the knowledge or understanding gained from research, directed toward the production of useful materials, devices, systems, or methods including design and development of prototypes and processes.

Exclusions from research and development:

1. Training of scientific manpower
2. Mapping and surveys
3. Routine product testing
4. Quality control
5. Experimental production
6. Collection of general purpose statistics (statistics not collected as part of a specific R&D project)

NOTE: Certain activities may or may not be classified as research and development depending upon circumstances. Examples of such activities are given in the supplemental instructions on page 7.

B. **Selected financial terms**

1. **Fiscal Year 1990** - The 12-month accounting period ending August 31, 1990.

2. **Expenditures** - All amounts of money paid out by your institution to support R&D activities. Include funds "passed through" to other institutions of higher education. Include earned indirect costs and fringe benefits.

3. **Federal Funds** - All Federal monies used in support of the R&D activities of your institution. These include reimbursements, contracts, grants, and any identifiable amounts spent from Federal programs.

4. **State Sources** - Include all expenditures of funds appropriated by the State of Texas not included in institutionally controlled funds listed below. Included in this category are funds from the Research Enhancement Program, "Special Items," ATP and ARP funds, interagency contracts, contracts with Texas local governments, etc.

group. These include anthropology, economics, history, linguistics, political sciences, and sociology.

2.K. **Other sciences not elsewhere classified** is a category to be used for multidisciplinary and interdisciplinary projects and cannot be classified within one of the broad fields of science listed above.

2.L. **Arts and humanities** includes topics such as art, music, history, languages, religion, and other aspects of man's culture and heritage.

2.M. **Business administration** deals with the management and operation of business enterprises. It includes work in management, marketing, accounting, and related topics.

2.N. **Education** includes research related to any aspect of education. This includes elementary, secondary, and higher education; educational policy; education administration; etc.

2.O. **Law and public administration** includes research related to legal systems and to public policy at the federal, state, or local levels.

2.P. **Other non-science activities** should include all non-science disciplines not appropriately categorized above.

3. **Areas of Special Interest**

This section is intended to provide information on expenditures in areas of special interest to the public. The list is not all-inclusive. The sum of the totals in columns 3.A. through 3.J. will not normally be equal to 1.A. Further, expenditures may overlap two or more categories (e.g., a given project may be reported both as materials science and microelectronics). Institutions may need to use ad hoc estimators to come up with these numbers.

4. **Character of Work**

Using the definitions provided in "General Concepts and Definitions," above, institutions may wish to estimate the amount of basic research vs. applied R&D by assuming that funds from some sources are expended for basic research while other sources support applied research. For example, on a given campus it might be appropriate to assume federal funds support basic research, funds from for-profit private institutions support applied research, etc.

5.A. **Peer-reviewed selection processes** are processes which involve critical reviews by technically qualified persons from outside the agency making the award. For example, most grants and contracts from NSF, NIH and similar agencies would be included. Grants from the Texas Advanced Research and Advanced Technology programs would be included. Institutions may wish to estimate the quantity of peer-reviewed research using proxies similar to those described in 4, above.

5.B. **Negotiated or other awards** are awards made on the basis of some process other than peer review. These would include all grants and contracts made on the basis of a decision made internal to the agency making the award. "Special items" appropriated by the Texas legislature would be included in this category. Similarly, research grants made by industrial concerns and contracts awarded for a specific development task are typically awarded in this fashion.

5. **Institutionally Controlled** - Include expenditures of funds which are locally controlled. This would include PUF and AUF funds, other local funds, etc.

6. **Private** - Include expenditures of funds from both for-profit and non-profit corporations and individuals. Also, include in this category funds from agencies from other states.

DEFINITIONS FOR SPECIFIC ITEMS

(Numbering corresponds to line number on data collection form)

1.A. **Expenditures for conduct of R&D** - All expenditures except those for R&D plant.

1.B. **Other sponsored activities** includes other externally-funded activities which cannot be classified as research using the definitions appearing in A, above. Examples might include technical training programs, sponsored data collection efforts, R&D plant expenditures not properly included in A, etc. Do not include projects funded with "development" funds unless they are related to research activities.

2.A. **Engineering** is concerned with studies directed toward developing engineering principles or toward making specific principles useable in engineering practice. Engineering fields include aeronautical, astronautical, chemical, civil, electrical, mechanical, metallurgy and materials, and engineering not elsewhere classified, such as agricultural, bioengineering, biomedical, industrial, nuclear, ocean, and systems.

2.B. **Physical sciences** are concerned with the understanding of the material universe and its phenomena. They comprise the fields of astronomy, chemistry, physics, and physical sciences not elsewhere classified.

2.C. **Environmental sciences** (terrestrial and extraterrestrial) are concerned with the gross, nonbiological properties (with one exception) of the areas of the solar system that directly or indirectly affect man's survival and welfare. They comprise the fields of atmospheric sciences, geological sciences, and oceanography. The one exception is that expenditures for studies pertaining to life in the sea or other bodies of water are to be reported as support of oceanography and not biology.

2.D. **Mathematical sciences** employ logical reasoning with the aid of symbols and are concerned with the development of methods of operation employing such symbols.

2.E. **Computer science** is concerned with the application of mathematical methods to automated information systems, the development of computer technology, and advanced applications of computers.

2.F. **Medical sciences** are concerned with the causes, effects, prevention, or control of abnormal conditions in man or his environment as they relate to health. Included are the clinical medical sciences, which are concerned with the study of the origins, diagnosis, or treatment of a particular disease in living human subjects under controlled conditions, and other medical sciences. Examples of the medical sciences are as follows: internal medicine, neurology; ophthalmology; preventive medicine and public health; psychiatry; radiology; surgery; veterinary medicine; dentistry; physical medicine and rehabilitation; podiatry.

2.G. **Agricultural sciences** deal with the production of food and fiber. They include work in plant sciences, animal sciences, acquaculture, agricultural economics, and other topics related to the agricultural enterprise.

2.H. **Biological sciences** are those life sciences (apart from medical sciences and agricultural sciences described above) which deal with the origin, development, structure, function, and interaction of living things. Examples of biological sciences are as follows: anatomy; animal sciences; bacteriology; biochemistry; biogeography; biophysics; ecology; embryology; entomology; evolutionary biology; genetics; immunology; microbiology; nutrition and metabolism; parasitology; pathology; pharmacology; physical anthropology; physiology; plant sciences; radiobiology; systematics.

2.I. **Psychology** deals with behavior, mental processes, and individual and group characteristics and abilities. Examples of disciplines within psychology are as follows: experimental psychology; animal behavior; clinical psychology; comparative psychology; ethnology; social psychology; educational, personnel, vocational psychology and testing; industrial and engineering psychology; development and personality.

2.J. **Social sciences** are directed toward an understanding of the behavior of social institutions and groups and of individuals as members of a

Institution _____ FICE Code _____

SOURCES OF FUNDS (in whole dollars)

	Federal	State Sources	Inst. Controlled	Private	Total
1. TOTAL Expenditures for Sponsored Programs (distribute by Type A and B below):					
A. Total Expenditures for Conduct of R&D					
B. Expenditures for other Sponsored Activities					
2. TOTAL Expenditures for Conduct of R&D by Field (Total should equal item 1.A; distribute by field at A-P below):					
A. Engineering					
B. Physical sciences					
C. Environmental sciences					
D. Mathematical sciences					
E Computer science					
F. Medical sciences					
G. Agricultural sciences					
H. Biological and other life sciences					
I. Psychology					
J. Social sciences					
K. Other sciences not classified above. Describe in NOTES.					
L. Arts and humanities					
M. Business administration					
N. Education					
O. Law and public administration					
P. Other non-science activities not classified in L through O, above. Describe in NOTES.					

Institution _____ FICE Code _____

SOURCES OF FUNDS (in whole dollars)

	Federal	State Sources	Inst. Controlled	Private	Total
3. Expenditures for Conduct of R&D in Areas of Special Interest:					
A. Energy					
B. Food, fiber, agricultural products					
C. Cancer Research					
D. AIDS Research					
E. Biotechnology					
F. Materials Science and Engineering					
G. Manufacturing Technology					
H. Microelectronics and Computer Technology					
I. Aerospace Technology					
J. Environmental Science and Engineering					
4. TOTAL Expenditures for Conduct of R&D by Character of Work (Total should equal item 1.A; distribute by character of work at A and B below):					
A. Basic research					
B. Applied research and development					
5. Selection Process (Total should equal item 1.A; distribute to A and B below):					
A. Funds derived from a competitive, peer-reviewed selection process					
B. Funds derived from a negotiated or other selection process					

SUPPLEMENTAL INSTRUCTIONS AND DEFINITIONS

REPORTING GUIDELINES FOR R&D VERSUS NON-R&D ACTIVITIES

1. **Economic studies** - To be classified as research, the activities under this heading should be systematic and intensive. They should not include program planning, implementation, and evaluation unless these activities are designed as a fairly rigorous research effort. For example, a study to determine the impact of proposed tax changes on State revenues, or on Statewide employment, consumption, or industrial output could be reported as economic research. But the collection of economic data on tax revenues, personal income, or industrial output would be reported as economic research only if collected as part of the research project.

2. **Evaluation** - Evaluation qualifies as research when it is part of a specific research undertaking. Evaluation conducted separately from a research project is considered research when it involves scientific method and hypothesis testing procedures with fairly rigorous standards. Evaluation activities that do not involve systematic design and testing should not be included.

3. **Demonstration** - Demonstration activities that are part of research or development (i.e., that are intended to prove or to test whether a technology or method does, in fact, work) should be included. Demonstration intended to make available information about new technologies or methods should not be included. For example, an educational demonstration on new teaching methods should be reported as an R&D activity if the demonstration is established as an experiment to produce new information, is accomplished within a definite time period, and is accompanied by a thorough evaluation. An educational demonstration to apply or exhibit new teaching methods, or a demonstration without a scheduled termination or a thorough evaluation, should not be reported as an R&D activity.

4. **Collection of statistical data** - The collection of statistics is an R&D activity only if conducted as part of a specific research or development program. For example, the regular collection and publication of statistics on the incidence of various diseases within a State by a State health department is general-purpose data collection and not research or development. The data gathering is not part of a research program and is designed for use by a range of persons, such as practicing physicians, public health officials, and school officials. If the data on incidence of diseases are gathered as part of a project on the origin and nature of particular diseases, however, or to establish generalizations on why certain individuals or groups contract certain diseases, this would be research.

5. **Satellite information** - Photographs and tapes purchased from Federal agencies (or others) sponsoring satellite operations are not considered research and development unless they are used primarily in support of a research or development program. Tapes and photographs that are stored in documentation centers or used primarily for the formulation of regulations are excluded from this survey.

6. **Technology transfer** - Technology transfer involves the adoption, and perhaps adaptation, of new techniques or products that have already been brought to a useable condition. The adoption and use of a technology is not research and development, but the adaptation of a technology to meet unique regional or local needs could involve R&D activities. For example, a new method of treating water to make it potable is developed in one State. If another State adopts the same treatment process, the adoption costs for facilities, equipment, personnel, etc., are not R&D expenditures. However, if further systematic, intensive study is required by the second State to modify the treatment process to adapt it to unique local conditions, the costs of modification and adaptation could be R&D expenditures.

Appendix B

The following list contains the institutional contacts who submitted the data for this report. For additional information regarding research activities on individual campuses, those persons should be contacted directly.

Angelo State University
Robert L. Krupala
Vice President, Fiscal Affairs
(915) 942-2017

Corpus Christi State University
Albert Trevino
Associate Vice President for Academic Affairs
(512) 994-2333

East Texas State University
Keith D. McFarland
Dean, Graduate Studies/Research
(214) 886-5159

East Texas State University at Texarkana
Joan C. Beckham
Director, Fiscal Affairs
(903) 838-6514, ext. 239

Lamar University
Jonathan M. Logan
Supervisor, Research & Grants
(409) 880-8997

Laredo State University
Leo Sayavedra, President
(512) 722-8001, ext. 300

Midwestern State University
Philip S. Colee
Director, Institutional Research & Planning
(817) 696-6787

Prairie View A & M University
Leonard L. Campbell
Supervisor, Restricted Funds
(409) 837-2415

Sam Houston State University
Billy C. Covington
Director, Faculty Research
(409) 294-3621

Southwest Texas State University
Bob Cavendish
Director, Grants Administration
(512) 245-2102

Stephen F. Austin State University
Jerry W. Vincent
Director, Research Services
(409) 568-2237

Sul Ross State University
Oscar P. Jimenez
Assistant Comptroller
(915) 837-8042

Tarleton State University
Mike Moser
Director, Accounting Services
(817) 968-9107

Texas A&I University
Claudia Conard
Supervisor, Grants/Loans, Fiscal Affairs
(512) 595-3087

Texas A&M University
Duwayne M. Anderson
Associate Provost for Research and
Graduate Studies
(409) 845-8585

Texas A&M University at Galveston
C. S. Giam
Director, Coastal Zone Laboratory
(409) 740-4465

Texas A&M University College of Medicine
Duwayne M. Anderson
Associate Provost, Research/Graduate Studies
(409) 845-8585

Texas College of Osteopathic Medicine
David M. Richards, President
(817) 735-2509

Texas Southern University
Joseph Jones
Dean, Research & Graduate Studies
(713) 527-7232

Texas Tech University
Robert M. Sweazy
Vice Provost for Research
(806) 742-3884

Texas Tech University Health Sciences Center
Elmo M. Cavin
Vice-President, Fiscal Affairs
(806) 743-3080

Texas Woman's University
Elizabeth Petersen
Controller
(817) 898-3525

The University of Texas at Arlington
J. D. Wetsel
Vice President for Business Affairs
(817) 273-2102

The University of Texas at Austin
Joe A. Powell
Associate Vice President, Business
(512) 471-1422

The University of Texas at Dallas
Robert L. Lovitt
Vice President for Business Affairs
(214) 690-2213

The University of Texas at El Paso
March H. Guevara
Director, Accounting Services
(915) 747-5197

The University of Texas of the Permian Basin
E. D. Stringer, Director of Accounting
(915) 367-2110

The University of Texas-Pan American
Paula Zepeda
Grants and Contracts Supervisor
(512) 381-2711

The University of Texas-Pan American-Brownsville
Aber Hinojosa, Dean, Business Affairs
(512) 982-0170

The University of Texas at San Antonio
Carol A. Hollingsworth
Director, Grants and Contract
(512) 691-4230

The University of Texas at Tyler
Ronald T. Wall
Chief Fiscal Officer
(903) 566-7107

The University of Texas Health Science Center at Houston
Jerry D. Ellis
Assistant Vice President, Financial Services
(713) 792-4273

The University of Texas Health Science at San Antonio
R. B. Price
Executive Vice President for Administration and Business Affairs
(512) 567-2000

The University of Texas Health Center at Tyler
Dennis P. Kilday
Associate Director, Fiscal Affairs
(214) 877-7722

The University of Texas M. D. Anderson Cancer Center at Houston
Michael J. Best
Associate Vice-President, Business Affairs
(713) 792-7550

The University of Texas Medical Branch at Galveston
Richard S. Moore
Vice President, Business Affairs
(409) 761-6454

The University of Texas Southwestern Medical Center at Dallas
Dr. Peter H. Fitzgerald
Executive Vice President for Business Affairs
(214) 688-3572

University of Houston
Julie T. Norris
Assistant Vice President & Director
(713) 749-3412

University of Houston - Clear Lake
Nancy B. Bell
Assistant Vice President, Research and
Sponsored Programs
(713) 283-3015

University of Houston - Downtown
Mike Murphy
Vice President for Academic Affairs
(713) 221-8003

University of Houston - Victoria
Don N. Smith
Dean, Academic Affairs
(512) 576-3151, ext. 215

University of North Texas
Phillip Diebel
Vice President for Fiscal Affairs
(817) 565-3246

West Texas State University
Gary Barnes, Controller
(806) 656-2080

for additional information
or additional copies of this report

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Austin, TX 78711-2788
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